SC-209 CONSOLIDATED COMMENTS MATRIX
Draft of Proposed Mode-S MOPS – DO-181D, draft v0.5

#	Reviewer Name/ Org./Office Symbol	Page No.	Paragraph #	COMMENT / RATIONALE	PROPOSED RESOLUTION(S)
1	John Van Dongen, FAA AJP-1850	6	1.4.3.1	Item b uses the term "intermode" instead of ATCRBS/Mode S. Since this is the only use of this term in the document, there may be uncertainty associated with its meaning.	**Replace "intermode" with "ATCRBS/Mode S".** **SC209: Agreed and Implemented**
2	John Van Dongen, FAA AJP-1850	28	2.2.7.2.2	This requirement section simply contains the text "Not Used."	**Shift sections 2.2.7.2.3 through 2.2.7.2.6 back one section and eliminate the "Not Used". All references to the affected sections will need to change accordingly.** **SC209: Decision delayed until later during meeting, but deletion of this section was accomplished post-meeting and the comparison matrix will be updated.**
3	John Van Dongen, FAA AJP-1850	42,43	Figures 2-4, 2-5	Under the *Notes* for these 2 figures, item #2 denotes the free coding space as number surrounded by dashes as fill. The figures no longer use the dashes consistently.	**Replace the white-space in the unused fields in the figures with dashes to be consistent with the *note*.** **SC209: Gary standardized these and several other Figures post-meeting.**
4	John Van Dongen, FAA AJP-1850	62	Figure 2-11	After decision K, yes needs to proceed to "recover" and the two probability decisions "no reply" paths need to go to "recover".	**Add "RECOVER" to the yes branch of decision "K", and replace the "R" with "RECOVER" between the two probability decision processes.** **SC209: Agreed and implemented.**
5	John Van Dongen, FAA AJP-1850	65	Figure 2-12	Need "YES" and "NO" 's added to 2nd part of figure 2-12.	**Add "NO" below, and "YES" to the right of the two decisions: DI=3 and LSS=1.** **SC209: Agreed and implemented into DO-181D post-meeting.**
6	Bob Granville Retired FAA	80	2.2.19.1.12 Fig 2-19	In the upper left corner of the Figure, the second diamond down is not labeled.	Add "J" in the upper part of the diamond "UF=4.5.20.21". Reference SC209-WP04-13-Fig2-19. **SC209: Agreed and implemented into DO-181D post-meeting**

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#	Reviewer Name/ Org./Office Symbol	Page No.	Paragraph #	COMMENT / RATIONALE	PROPOSED RESOLUTION(S)
7	Bob Granville Retired FAA	80	2.2.19.1.12 Fig 2-19	In the approximate center of the Figure there is no way to get into diamond "H" but two ways to get out. (Two gozoutas and no gozintas.)	Add a vertical line down from diamond "G" to diamond "H" and add "yes" next to it. Reference SC209-WP04-13-Fug2-19. **SC209: Agreed and implemented into DO-181D post-meeting**
8	John Van Dongen, FAA AJP-1850	95	Figure 2-20	Missing "NO" in 3rd decision block "I".	**Add "NO" below decision block "I".** **SC209: Agreed and implemented into DO-181D post-meeting**
9	John Van Dongen, FAA AJP-1850	137	Figure 2-28	Problem: Figure 2-28 not referenced anywhere. Figure 28 shows a test configuration where the transponder video (1030?) and the test set video (1090?) are being monitored on the oscilloscope. (Is the transponder video always available?) Need to determine what test(s) would use this configuration and reference it, or remove the figure.	**Discuss.** **SC209: ??????? more research required to resolve**
10	John Van Dongen, FAA AJP-1850	155	2.4.2.3.1 Step 3	Typographical error - ARCRBS	**Replace "ARCRBS" with "ATCRBS".** **SC209: Agreed and corrected**
11	John Van Dongen, FAA AJP-1850	155	2.4.2.3.2 Step 1	Was the change to 1 dB increment from 5 dB accepted? In all other cases, the SC209 consensus was to leave the test procedures with the original test increments.	**Return to the original 5 dB increment pending confirmation from SC209.** **SC209: Agreed and implemented**
12	John Van Dongen, FAA AJP-1850	62	Figure 2-11	The Figure 2-11 title is "The Basic Transponder: Interrogation Acceptance".	**Change to "The Level 1 Transponder: Interrogation Acceptance". Also update in the list of figures.** **SC209: Agreed and implemented**
13	John Van Dongen, FAA AJP-1850	72	2.2.19.1	The first sentence refers to the basic transponder functions.	**Change to use the transponder level terminology: "… in addition to the functions of the Level 1 transponder:".** **SC209: Agreed and implemented**

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#	Reviewer Name/ Org./Office Symbol	Page No.	Paragraph #	COMMENT / RATIONALE	PROPOSED RESOLUTION(S)
14	John Van Dongen, FAA AJP-1850	175	2.5.1 under "Transponder States:" 2nd and 4th paragraphs	Text refers to the basic transponder.	**Change to use the transponder level terminology: " The overall state of the Level 1 transponder …" and "The Level 1 transponder could receive …".** **SC209: Agreed and implemented**
15	John Van Dongen, FAA AJP-1850	180	2.5.4.2 just below test procedure title	The first 3 references to the requirements refer to the basic transponder.	**Change to use the transponder level terminology: in all 3 cases, change "basic" to "Level 1".** **SC209: Agreed and implemented**
16	John Van Dongen, FAA AJP-1850	182	2.5.4.4.1 Positive Tests	Text refers to the basic transponder.	**Change to use the transponder level terminology: "Repeat with UF=5, PC=1 for level 1 transponder."** ***"Note: This sequence must be modified for Level 1 transponders, … "*** **SC209: Agreed and implemented**
17	John Van Dongen, FAA AJP-1850	187	2.5.4.5 Test #2	Test #2 Title refers to basic transponder.	**Change to use the transponder level terminology: "… (Level 1 transponder)".** **SC209: Agreed and implemented**
18	John Van Dongen, FAA AJP-1850	197	2.5.4.7 Interrogation Patterns and Transaction Summary	Text refers to basic transponder.	**Change to use the transponder level terminology: "Interrogation Patterns for the Level 1 Transponder"** **SC209: Agreed and implemented** **Under Transaction Summary: "Level 1 Transponder:"** **What is a basic option transponder???????** **Need to research the "basic option."**
19	John Van Dongen, FAA AJP-1850	201	2.5.4.10 Transponder Designs	Text refers to basic transponder.	**Change to use the transponder level terminology: in 2nd paragraph last sentence "364 replies tested for a Level 1 transponder … "** **SC209: Agreed and implemented**

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#	Reviewer Name/ Org./Office Symbol	Page No.	Paragraph #	COMMENT / RATIONALE	PROPOSED RESOLUTION(S)
20	John Van Dongen, FAA AJP-1850	207	2.5.4.14	Test procedure is not used.	**Remove test procedure from document.** **SC209: Agreed – set to "Not used."**
21	John Van Dongen	245, 246	Table 2.3.1.1 & Table 2.3.1.2	These two tables belong in section 2.3.1 where they are referenced rather than at the end of section 2.	**Move the tables to the end of section 2.3.1 (page 132).** **SC209: Agreed and implemented post-meeting**

The following set of comments were submitted by Raymond Bayh and because of the nature of most of the comments were not entered into the matrix format above:

DO-181D, V0.5 updates/corrections/clarification/comments

Section 1.1, last paragraph:

If the equipment implementation includes a computer software package, the guidelines contained in the most current issue of RTCA/DO-178, *Software Considerations in Airborne Systems and Equipment Certification*, should be considered. If the equipment implementation includes design considerations for use in conjunction with TCAS functionality, the guidelines contained in the most current issue of RTCA/DO-185, *Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System (TCAS) Airborne Equipment*, should be considered. If the equipment implementation includes design considerations for use in conjunction with ADLP functionality, the guidelines contained in the most current issue of RTCA/DO-218, *Minimum Operational Performance Standards for an Airborne Data Link Processor*, should be considered.
Is this still true when the ADLP MOPS is moved into the DO-181D Appendix B?
SC-209 - Agreed to strike the sentence in blue. Implemented post-meeting.

==========

1.2.1 The Function of Mode S
Mode S is a cooperative surveillance and communication system for air traffic control. It employs ground-based and airborne sensors (interrogators) and airborne transponders.
SC-209 – Agreed and implemented

==========

1.4.3.2 (also addressed in SC209-WP05-12)
Level 2 transponders **shall** have the capabilities of §1.4.3.1 and also those prescribed for:
a. standard length communications (Comm-A and Comm-B),
b. data link capability reporting, and
c. aircraft identification reporting.
d. Support of SI codes
SC-209 – Agreed (OBE in WP05-12)

==========

1.4.3.6 (also addressed in SC209-WP05-12)
add another bullet: transponders supporting SI codes shall have the capabilities of §1.4.3.2, §1.4.3.3, §1.4.3.4 or §1.4.3.5 and also those prescribed for SI code operation. Transponders with this capability **shall** be designated with a suffix "s."
SC-209 – Agreed (OBE in WP05-12)

==========

2.2.10.3 Mode S Address Verification
The Mode S transponder **shall** declare a transponder failure in the event that its own Mode S address is all zeros or all ones.

After declaring the failure, what should the transponder do? Shouldn't the transponder at least revert to ATCRBS only if a failure occurs in flight?
SC-209 – Agreed to leave 2.2.10.3 alone. No change.

==========

2.2.11 Response to Mutual Suppression Pulses

Add the following:

2.2.11.1 Minimum Suppression out characteristics.

The suppression output signal shall precede the transponder RF transmission by no more than 10 microseconds and return to the inactive state in less than 10 microseconds.
Any Transponder/TCAS impact?
SC-209 – Agreed, with numbers above set to 10. Also changed the basic paragraph to set it as a requirement. Implemented post-meeting.

==========

2.2.12 Diversity Operations
Diversity Mode S transponders may be implemented for the purpose of improving air-to air surveillance and communications. Such systems **shall** employ two antennas, one mounted on the top and the other on the bottom of the aircraft. Appropriate switching and signal processing channels to select the best antenna on the basis of the characteristics of the received interrogation signals **shall** also be provided. Such diversity systems, in their installed configuration, **shall** not result in degraded performance relative to that which would have been produced by a single system having a bottom-mounted antenna.

Add Note: ACAS operations require diversity operations. Use of diversity is highly recommended for any transponder installation.
SC-209 – Agreed. Implemented post-meeting.

==========

2.2.12.4 Reply Delay of Diversity Transponders
The total difference in mean reply delay between the two antenna channels (including the transponder-to-antenna cables) **shall** not exceed 0.08 microsecond for interrogations of equal amplitude. This requirement is applicable to interrogation signal strengths between MTL +3 dB and -21 dBm.

Implies installed system performance or must test with "standard diversity test cables" – how do the manufacturers pass test?
SC-209 – Agreed that no change is necessary in 2.2.12.4

==========

2.2.13.1.2
(1) ATCRBS – When operated in the ATCRBS system, the altitude **shall** be transmitted in response to a Mode C interrogation, encoded in accordance with ICAO Annex 10. If **valid** altitude information is not available to the transponder, only the framing pulses required for a Mode C response **shall** be transmitted.
SC-209 – Agreed and implemented

==========

2.2.13.3.1 Uplink Interface
a. Information Content – **If equipped for Comm-A or Comm-C operation, the airborne data link** interface **shall** transfer the entire content of both short and long accepted uplink interrogations (with the possible exception of the AP Field) except for interrogations UF=0, 11,16 and a UF=24 interrogation containing a request for a downlink ELM transfer (RC=3). This permits the receiving devices to properly identify the data field contents and permits possible additional parity determination at the I/O device.
SC-209 – Agreed to defer this comment to review at a later time.

==========

2.2.13.3.1 Uplink Interface
d. Storage Design, Non-Acceptance – The transponder **shall** ~~not~~ accept a Comm-A interrogation (UF=20, 21) regardless if the data content of that interrogation can or cannot be processed (see 'UNABLE TO PROCESS,' Figure 2-16).
~~***Note:*** *The Mode S reply is the sole means of acknowledging receipt of the content of an interrogation. Thus if the transponder is capable of replying to an interrogation, the airborne data system must be capable of accepting the data contained in that interrogation regardless of the timing between it and other accepted Mode S interrogations. Overlapping Mode S beams from several interrogators could lead to the requirement for considerable data handling and buffering. The minimum, prescribed in c above, reduces data handling to a realistic level. The non-acceptance provision provides for notification to the interrogator that data temporarily will not be accepted.*~~
SC-209 – Agreed to defer this comment to review at a later time.

==========

2.2.13.3.1.
f. Transponder Capability – The transponder datalink communication capacity information **shall** be made available to the ADLP. This information includes the ELM capacity of the transponder and the ability of the transponder to support the enhanced datalink ~~transponder capability~~.
protocols
SC-209 – Agreed and implemented

==========

2.2.13.3.2 Downlink Interface
c. Storage Design – Buffer Rate – If the interface shifts data into the transponder at a rate slower than the transmission rate, the internal data system **shall** be able to provide the data to support the reply rate specified in §2.2.3.4.2.

Note: *Certain transponder designs may require downlink registers called for by an RR value, as well as downlink registers called for by special formats or DI content.*
How does this note fit in? Remove note, not applicable to Storage Design/Buffer rate.
SC-209 – Agreed that the Note should stay in. No change.

==========

2.2.13.3.2 Downlink Interface
e. Unavailable Data – If an interrogation requests~~, as in c above~~, data that are not available, the transponder **shall** insert ZERO (0) into the affected fields of the reply.

Note: *The no-storage design requirement can be met by assuring that a nonconnected data source or an open interface connection results in zero level inputs. The storage design requirement can be met by assuring the transmission of "0" if the readout from a nonexistent register is requested. An input to provide information for air-initiated multisite directed transmissions (see §2.2.19.2.3.2 and §2.2.20.2.3.2) may have to be provided.*
Is this relevant?
SC-209 – Agreed that there would be no change currently

==========

Figure 2-6:Field Index: add the following to the table :

FIELD	Subfield	No.	Position	Up	Down	Content	protocol
AF		3	6- 8		X	2.2.14.4.3	2.2.23.4.1
CF		3	6 – 8		X	2.2.14.4.8	2.2.23.3.1
II		4				2.2.14.4.17	2.2.18.2.2(g) 2.2.18.2.4 2.2.18.2.5
SI		6		X	X	2.2.14.4.36	2.2.18.2.5 2.2.18.2.9

SC-209 – Agreed that the table should be updated. Implemented post-meeting.

==========

2.2.14.4.32 RI Reply Information, Air-To-Air : add to table

0 – 7 Codes indicate that this is the reply to an air-to- air non-acquisition interrogation.
0 No on-board TCAS
1 Not assigned
2 On-board TCAS with resolution capability inhibited
3 On-board TCAS with vertical-only resolution capability
4 On-board TCAS with vertical and horizontal resolution capability
5 – 7 Not assigned
8 – 15 Codes indicate that this is an acquisition reply.

8 No maximum airspeed data available.
9 Airspeed is less than or equal to 75 knots.
10 Airspeed is greater than 75 and less than or equal to 150 knots.
11 Airspeed is greater than 150 and less than or equal to 300 knots.
12 Airspeed is greater than 300 and less than or equal to 600 knots.
13 Airspeed is greater than 600 and less than or equal to 1200 knots.
14 Airspeed is greater than 1200 knots.
15 Not assigned.

SC-209 – Agreed that the change should be made. Implemented post-meeting.

==========

2.2.18.2.7.c

If the automatically-determined air/ground status is not available or is "airborne", no validation **shall** be performed. If the automatically-determined air/ground status is available and "on-the-ground" condition is being reported, the air/ground status **shall** be overridden and changed to "airborne" if the conditions given for the vehicle category in the following table are satisfied.

Check table against current SARPS values.

SC-209 – Agreed during the meeting that the table was correct with DO-260A and the 1090ES SARPs. HOWEVER, post-meeting reflection led to Gary Furr assigning himself an action item to review the text of the 1090ES MOPS and SARPs and ensure that the language in DO-181D matches that in the MOPS/SARPs.

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Table 2.2.16-1: Acquisition Squitter Transmission Requirements

Aircraft On-The-Grou~~u~~nd Condition: spelling

Same table:

At Least on Surveillance Type Extended Squitter Transmitted: spelling in two places

SC-209 – Agreed and implemented

==========

2.2.18.2.10 Reply Content (Figure 2-14)

~~The information content of a Mode S reply **shall** reflect the conditions existing in the transponder after completion of all transponder processing of the interrogation required for preparation of that reply~~. Is there any value to this statement?

In the reply to UF=0, the transponder **shall** insert:
VS in bit 6.
RI in bits 14 to 17.
AC in bits 20 to 32.
In the reply to UF=4, AC **shall** be in bits 20 to 32. In the reply to UF=5, ID **shall** be in bits 20 to 32. In the reply to UF=11, AA **shall** be in bits 9 to 32. In replies to UF=4 and UF=5, the transponder **shall** insert ZEROs in bits 9 through 13 in the DR field.

SC-209 – Agreed that there probably needs to be a change, which may be to make the text identical to that in ED-73C. May review again in Melbourne Meeting

==========

ZZZZZZZZZZ STOPPED SC-209 MEETING REVIEW HERE ZZZZZZZZZZZZ

2.2.19
e. Message Content, Specified
This document specifies message content only for standardized messages which have their data base within the transponder. These are the data link capability report (BDS 1,0) and the aircraft identification report (BDS 2,0) using Comm-B, and the transmission and acknowledgment subfields of the downlink ELM protocol (see §2.2.19.1.11.5, §2.2.19.1.12 and §2.2.20.1.1.1.6)
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1 Minimum Level 2 Transponder Requirements
The operational functions described in §1.4.3.b require that this transponder **shall**, in addition to the functions of the ~~basic~~ Level 1 transponder:
Implemented Post Meeting by Gary Furr as a simple editorial change

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a. Process uplink and downlink formats UF 20 and 21, DF=16, 20 and 21 (Figure 2-15). The format UF=16 ~~are optional~~ shall only be processed by a TCAS-compatible transponder.

c. Follow the protocols for:
Comm-A (see §2.2.19.1.9) (Optional depending on Subclass)
Comm-B (see §2.2.19.1.11).
Comm-U/V (air-air) (see §2.2.19.1.15) (optional).
Multisite message operation (see §2.2.19.2).
Not Implemented – not a simple editorial change – further discussion required

==========

Figure 2-15: All ~~Data Link~~ Level 2 Transponders: Formats
Notes:
1. Uplink and downlink formats 16 are used in TCAS applications ~~and are optional~~.
Implemented Post Meeting by Gary Furr as a simple editorial change

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Figure 2-16: remove UNABLE TO PROCESS, where does R go??
Not Implemented – not a simple editorial change – further discussion required

==========

2.2.19.1.3 Information Transfer
The minimum ~~data link~~ Level 2 transponder **shall** be able to transfer information to and from the appropriate data sinks (destinations) and sources (see §2.2.13 and §2.2.19.c and §2.2.19.d).
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1.4: 3rd para:
If the transponder is not a TCAS compatible transponder and not operating with a functional TCAS system, ~~equipped with the optional long air-air formats UF=DF=16~~, it **shall** not accept UF=16 interrogations ~~and it **shall** not reply to UF=0 containing RL=1~~.
Not Implemented – not a simple editorial change – further discussion required

==========

Figure 2-17: All ~~Data Link~~ Level 2 Transponders: Coordination – figure title
Implemented Post Meeting by Gary Furr as a simple editorial change

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Figure 2-18: All ~~Data Link~~ Level 2 Transponders: UM Protocol – figure title
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1.10 Comm-A Protocol
Comm-A is the transmission of information from the ground to the aircraft by formats UF=20, 21. In addition to the content of the corresponding short formats (UF=4, 5) the Comm-A formats contain the additional 56-bit field MA.

The ~~minimum data link~~ Level 2 transponder shall reply to Comm-A formats regardless of whether the Comm-A 56 bit data field can be transferred from the transponder or not.

The minimum ~~**Data Link**~~ **Level 2** transponder ~~**shall**~~ **should** direct the content of received Comm-A formats to the interface if possible. (see §2.2.13.2).
Not Implemented – not a simple editorial change – further discussion required

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2.2.19.1.12.5 Data Link Capability Report
The data link capability report provides the interrogator with a description of the data link capability of the Mode S installation. The subfield definitions of the Data Link Capability Report are contained in Appendix B. The report is obtained by a ground-initiated Comm-B, containing RR=17 (see §2.2.19.1.12.3).
Implemented Post Meeting by Gary Furr as a simple editorial change

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~~**2.2.19.1.11.6 Subfields in MB for Data Link Capability Report**~~
~~The subfields within MB of the data link capability report are: BDS1 Code "1" is assigned to this 4-bit (33-36) subfield for all data link capability reports.~~
~~BDS2 is a 4-bit (37-40) subfield. The basic report uses BDS2=0.~~
~~**2.2.19.1.11.7 Coding of the Data Link Capability Report**~~
~~BDS1: 1 = Data Link Report~~

~~BDS2: 0 = Basic Report~~
~~Bit 65 relates to the transponder ability to deliver AIS report with coding as follows:~~
~~Bit 65=1, AIS report available,~~
~~Bit 65=0, No AIS report available.~~
~~***Note 1:*** *The format of the data link capability report is defined in RTCA/DO-218.* SCS: This 1-bit squitter (bit 66) capability subfield **shall** report the capability of the transponder to transmit Extended Squitter position reports. It **shall** be set to ONE if GICB registers 05 and 06 {HEX} have been updated within the last 10 ±1 seconds. Otherwise it **shall** be set to ZERO. The internal insertion of data by the transponder into these registers (altitude and surveillance status) **shall** not qualify as a register update for this purpose.~~
~~***Note 2:*** *GICB registers 05 and 06 {HEX} are used for the Extended Squitter airborne and surface position reports, respectively.*~~
~~SIC: This one bit (67) SI capability subfield **shall** report the capability of the transponder to process SI codes. It **shall** be set to ONE for transponders with SI code capability.~~
~~Otherwise it **shall** be set to ZERO.~~
~~Other bits are reserved for TCAS (see §2.2.22.1.2.2).~~

Not Implemented – not a simple editorial change – further discussion required

==========

2.2.19.1.13 Aircraft Identification Reporting and AIS Aircraft Identification Subfield in MB

a. Aircraft Identification Reporting
If so equipped, the transponder **shall** report the aircraft identification (aircraft radio call sign) used in the flight plan. This may be either the trip number assigned to commercial flights or the aircraft registration number, where applicable.
Note: ~~*There are indications that a*~~ *A firm requirement* ~~*may*~~ *exists for the AIS feature in European Airspace. In such usage, the identification number entered in field 7 of the ICAO flight plan format **shall** be transmitted in the AIS subfield.*

b. AIS Aircraft Identification Subfield in MB
If a surveillance or Comm-A interrogation (UF=4, 5, 20, 21) contains RR=12(hex) and DI other than 7, or DI=7 and RRS=0, the transponder **shall** report its aircraft identification number in the 48-bit (41-88) AIS subfield in MB

c. Coding of the AIS Subfield
~~The MB field containing the AIS subfield **shall** be coded as follows:~~
~~1 9 15 21 27 33 39 45 51~~
~~BDS Ch 1 Ch 2 Ch 3 Ch 4 Ch 5 Ch 6 Ch 7 Ch 8~~
~~8 14 20 26 32 38 44 50 56~~
Moved to Appendix B
~~***Note:*** *Aircraft Identification coding permits up to eight characters.*~~
The BDS code for the Aircraft Identification message **shall** be BDS1=2 and BDS2=0. ~~Each character **shall** be coded as a six-bit subset of the ICAO 7-unit coded character set (ICAO Annex 10) as illustrated in the following table. The character code **shall** be transmitted with the most significant bit b6 first. The reported aircraft code **shall** begin with the left-most character, character 1 (abbreviated as Ch 1 in the above diagram). Characters **shall** be coded consecutively without an intervening SPACE code. Any unused character spaces at the end of the subfield **shall** contain a SPACE character code.~~
Moved to Appendix B

d. Aircraft Identification Capability Reporting
Transponders that respond to a ground-initiated request for aircraft identification **shall** report this capability in the Data Link Capability Report according to §2.2.19.1.12.7.

e. Change of Aircraft Identification
If the aircraft identification reported in the AIS subfield is changed in flight, then the transponder **shall** report the new identification to the ground by use of the Comm-B Broadcast Message protocol.

~~f. Six-Bit Character Set for Coding Aircraft Identification in the AIS Subfield~~
~~b_6 0 0 1 1~~
~~b_5 0 1 0 1~~
~~b_4 b_3 b_2 b_1~~
~~0 0 0 0 P SP 0~~
~~0 0 0 1 A Q 1~~
~~0 0 1 0 B R 2~~
~~0 0 1 1 C S 3~~
~~0 1 0 0 D T 4~~
~~0 1 0 1 E U 5~~
~~0 1 1 0 F V 6~~
~~0 1 1 1 G W 7~~
~~1 0 0 0 H X 8~~
~~1 0 0 1 I Y 9~~
~~1 0 1 0 J Z~~
~~1 0 1 1 K~~
~~1 1 0 0 L~~
~~1 1 0 1 M~~
~~1 1 1 0 N~~
~~1 1 1 1 O~~
~~SP - SPACE code~~
Moved to Appendix B.

Not Implemented – not a simple editorial change – further discussion required

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2.2.19.1.14 Linked Comm-A Coding
Peripherals attached to the ~~minimum data link~~ Level 2 transponder may use the linked Comm-A protocol. The transponder is transparent to this protocol.
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1.15 Multisite Message Protocol
The ~~minimum data link~~ Level 2 transponder **shall** use the multisite message protocol of §2.2.19.2 as it applies to Comm-D operation.
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1.16 Comm-U/V Protocol
The TCAS compatible transponder has the ~~optional~~ capability to receive, store and process information contained in the MU field of UF=16 and return the result of such process in the MV field of subsequent replies.
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.1.17 Data Handling and Interfaces
In addition to the interfaces described in §2.2.18.2.11, the ~~minimum data link~~ Level 2 transponder **shall** have interfaces for indirect data as specified in §2.2.13.2.
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.20.1.1 Uplink ELM Capability
This additional capability described in §1.4.3.3 requires that the transponder **shall**, in addition to the functions of the ~~minimum data link~~ Level 2 transponder:
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.19.2.2.1 Multisite Timers
The multisite protocols require three timers in the transponder:
B-timer for Comm-B
~~C-timer for Comm-C~~
~~D-timer for Comm-D~~
The C-Timer and D-Timer should be discussed in the ELM section

Not Implemented – not a simple editorial change – further discussion required

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2.2.19.3.1 Diversity
Diversity, as specified in §2.2.12, ~~may~~ should be ~~needed~~ implemented in wide-body aircraft and in conjunction with transponders installed with airborne collision avoidance systems (CAS).
Implemented Post Meeting by Gary Furr as a simple editorial change

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2.2.22 TCAS-Compatible Mode S Transponder
In addition to the ~~minimum data link~~ Level 2 Transponder capabilities defined in §2.2.19.1, the Mode S transponder used in conjunction with TCAS **shall** have the following capabilities:
Implemented Post Meeting by Gary Furr as a simple editorial change

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